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BUREAU OF PLANT INDUSTRY,

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THE CORN CROP.

The great American grain food for men and stock upon the farm is corn. Corn, intelligently managed, will produce more food per acre than any other cereal, and it is generally one of the safest of crops, which is an important item, because where men and animals must be fed certainty of production stands among the first requisites. More corn brings into use the pastures and idle lands of the farm. It is the basis of a cheaper food supply for the masses. Therefore, the production of an abundant supply of corn is one of the essentials of good farming.

The southern farmer should grow enough corn for every possible need of the farm, and he can. It has been demonstrated thoroughly that with proper preparation and cultivation he can grow as much per acre as the best farmers in the corn-growing States. At prevailing prices it is cheaper to produce it than to buy it, even with 12 and 15 cent cotton. Furthermore, the best farming requires systematic rotation of crops on all lands. From this standpoint corn should be regarded as a renovating crop. It is a plant of wide adaptability and can be produced in nearly all portions of the United States. It is especially valuable from the fact that we not only get the corn, but can grow with it a heavy crop of cowpeas, which will give a supply of nitrogen and humus, two of the most valuable items in building up soils.

Corn is a tropical plant, and all other things being equal it should thrive better in the Southern than in the Northern States. This, however, is not the case. What is the reason? The main cause is the lack of suitable seed beds in the South.

Experiments have shown that, while it sends many of its roots 3 or 4 feet deep, the corn plant places the great body of its feeding roots

from 3 to 12 inches below the surface where the soil is made loose enough by plowing or by frost to permit it. The roots send out in every direction an infinite number of hairlike growths, which absorb moisture and food. On soils properly prepared and in sections where the average annual rainfall is 35 inches or more the feeding ground for corn is usually from 2 to 12 inches below the surface. This is strictly true in the great corn belt of the Northwest, but much the larger portion of the feeding roots are located at a depth of 2 to 6 inches below the surface in well-prepared soil.

THE ROOT SYSTEM OF CORN.

At the Wisconsin Agricultural Experiment Station it was found that when corn was 3 feet high the roots had penetrated the soil for 2 feet and thoroughly occupied it. At maturity the roots were 4 feet deep. At this time the upper laterals were about 4 inches from the surface.

At the North Dakota Agricultural Experiment Station the corn roots had penetrated $3\frac{1}{2}$ feet deep and fully occupied the ground ninety days after planting. (See fig. 2.)

At the Minnesota Agricultural Experiment Station the corn roots had penetrated 12 inches deep and had spread laterally 18 inches

eighteen days after planting. In most portions of the South nothing less than an 8-inch seed bed will insure even a fair corn crop, and 10 inches is safer. Some soils may require more. From 6 to 8 inches of preparation for cotton corresponds to 8 and 10 inches for corn, so far as the requirements of the plant are concerned.

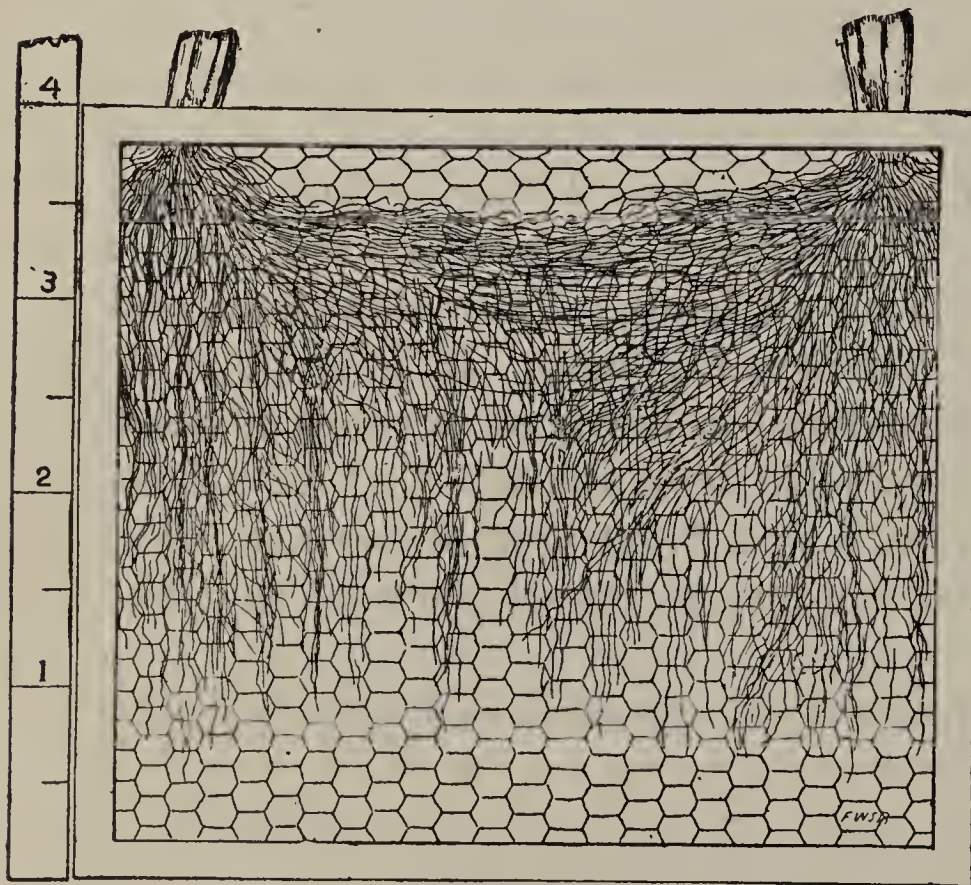


Fig. 2.—Distribution of roots of corn at the end of ninety days.
(From Farmers' Bulletin No. 233.)

In the South there has been too much shallow plowing. Breaking 3 or 4 inches is not deep enough to make a suitable feeding place for corn roots; on average land it furnishes neither sufficient food nor sufficient moisture for the plant to do its best. The trouble with a shallow seed bed is that it is too wet under heavy rainfall and too dry in periods of drought. To make its largest yield, corn requires not only a deep seed bed but a large amount of humus in the soil. Consequently most land requires some previous preparation—the plowing under of a green crop or the use of stable manure. The use of these is better preparation than to depend entirely upon commercial fertilizers. The land should also be well drained, because standing water even at a depth of one foot below the surface prevents the corn roots from deeper penetration and renders the soil too cold.

OBSERVE THE FOLLOWING IN MAKING A CORN CROP.

(1) Select a well-drained piece of land, filled with vegetable matter. Even if the soil has a fair amount of vegetable matter in it, good crops of cowpeas to be turned under in the fall or vetch or crimson clover to be turned under in the spring will greatly increase the yield of corn.

In case this can not be done, a good application of barn-yard manure or leaf mold from the forest, using from 10 to 20 two-horse loads per acre if broadcasted, will aid the crop if a large yield is sought.

(2) Break (plow) in the fall to a depth of a foot or more, with some implement that will not bring too much of the subsoil to the surface, and thoroughly pulverize. If this is done early enough, put in a winter cover crop of rye, oats, or barley, which should be turned under about $2\frac{1}{2}$ inches deep in the spring.

(3) Go over the land with a section harrow two or three times before planting and repeat immediately after planting and again after the corn is up, using the harrow at nearly right angles with the rows. The object sought is to pulverize the soil so thoroughly that it will be like a garden and thus prevent the formation of any crust or the growth of weeds.

(4) Use the best seed, and especially such seed as has been tested in the climate of the field to be planted.

The seed should not only be of the best variety but carefully selected in the fall and stored in a dry place.

In selecting the seed it is not advisable that it should be selected from the crib or even from the ordinary field, if the best results are

to be obtained. There should be a special plat for seed purposes ($\frac{1}{4}$ of an acre would generally be sufficient), which must receive the best preparation of the seed bed and the best seed obtainable, with excellent cultivation and fertilization. Then, before the pollen has matured, all barren stalks and all weak and diseased stalks should be removed, leaving nothing but strong, vigorous, well-eared stalks in the field, because corn is fertilized from all the surrounding plants. Therefore, the selection of a medium ear from a field where the average corn is excellent is better than a model ear from a field where most of the corn is inferior. Much depends also upon the vitality of the seed. To insure high vitality, corn must be gathered before the fall rains, put in a dry, well-ventilated place, and kept free from weevils. Corn is especially responsive to good treatment and careful selection. It is a crop easily improved and deteriorates as the result of bad management with corresponding rapidity.

(5) Test all seed corn before planting by placing samples in moist, warm soil or between sheets of saturated blotting paper. Do not use the irregular kernels at tip and butt. They are not so sure to germinate and if a machine is used for planting, the number of seeds dropped is not uniform because of the irregular size.

(6) Spacing: On well-drained lands under medium rainfall, planting corn in check rows is probably the most economic. For check rows $3\frac{1}{2}$ or 3 feet 8 inches each way appears to be generally accepted as the proper distance in the corn belt of the North. Where it is necessary to provide for surface drainage by ridging the corn, check-rowing is not practicable. This condition can be met by rowing one way and spacing the stalks more closely in the row.

In the South there are several good methods. Lay out the rows 6 feet apart and after the first working of the corn plant a row of cowpeas in each middle. This gives a cultivation of the cowpeas with the corn.

For average soil conditions in the South lay out the rows four feet apart and thin the corn to single stalks two feet apart in the row. This allows about 5,408 stalks to the acre. If the soil is better than average the stalks may be allowed a distance of 15 inches in the row. On highly fertilized soil the distance in the row may be decreased, and on special prize acres a distance of six inches has proven advantageous. The spacing of the prize acre for 1910 was rows $3\frac{1}{2}$ feet apart and distance in the row 6 inches. Prolific corn was planted and the yield was $228\frac{3}{4}$ bushels on one acre.

Whether the land should be bedded by turning two furrows together, or flat planted or listed (planted in the bottom of a furrow), depends on conditions of soil and climate. It is absolutely necessary to provide a well-drained seed bed for planting. If the soil does not furnish this naturally then bedding is essential.

DEPTH OF PLANTING.

It is not possible to give an absolute rule for depth of planting in all soils and under diverse conditions. This is as near as it can be stated: Plant shallow as possible and yet deep enough to insure germination.

Under some conditions half an inch would be better than deeper, while upon semi-arid soils it may require 4 inches. As a rule farmers plant too deep, so that germination is retarded and frequently the seed rotted by excessive moisture.

(7) Practice intensive shallow cultivation after the first. One and one-half to two inches deep in sections where the average annual rainfall is 35 inches or more is about right. Where the precipitation is less than that and especially where it is not regular,—that is, where there are liable to be rather long dry periods,—the feeding roots will not come quite so near the surface and it is necessary to have a deeper mulch, depending on the dryness of the period. In extreme cases it is necessary that the mulch should be 3 or 4 inches in order to protect the soil moisture.

Cultivate (stir the surface) once in 8 or 10 days, and always as soon after a rain as possible. More corn will be made if the cultivation is continued longer than usual.

The adjustable section harrow and the weeder are valuable aids in making a corn crop.

USE OF COMMERCIAL FERTILIZERS.

The importance of vegetable matter and stable manure has been previously stated.

If the land to be planted to corn has plenty of vegetable matter (humus), then it is advisable to use no commercial fertilizer till the corn is up. At the first cultivation apply on each side of the rows the following mixture at the rate of 250 pounds per acre,—one-third high-grade acid phosphate and two-thirds cottonseed meal, or the same quantity of commercial fertilizer called 10-3-2. (Acid phosphate, 10;

nitrogen, 3; potash, 2.) This should be sufficient for a common field crop of corn.

On lands that would generally produce 20 to 25 bushels of corn to the acre, apply 250 pounds of the above-mentioned fertilizer, well mixed with the soil in the rows 8 or 10 days before planting. In case of bedding, bed on the fertilizer. When the corn is a foot high apply 250 pounds of the same or a similar mixture on the sides of the rows just before cultivation. This makes a total of 500 pounds per acre on average lands. This double fertilizing is advised only when necessary to crop such lands in corn. It is our advice that lands which will not produce fifty bushels of corn on an acre by the application of 250 pounds of commercial fertilizer should be seeded to buckwheat, cow-peas or crimson clover and the crop turned under till the time when it will produce that number of bushels.

SPECIAL PREPARATION AND FERTILIZING OF LAND FOR VERY HIGH YIELDS.

Select as rich, sandy loam land as possible, well drained; plow in the fall 8 to 10 inches deep; then subsoil 8 inches more.

Before fall plowing, draw on 50 loads of leaf mold from the forest; during the winter put on 20 loads of well-rotted stable manure and scatter broadcast. In the spring thoroughly disc and plant in rows 4 feet apart and thin to single stalks 6 inches apart in the row. At the first cultivation apply on the sides of the rows 400 pounds per acre of cottonseed meal or some fertilizer of equal value; when the corn is 15 inches tall apply 400 pounds per acre, one-half high-grade acid phosphate and one-half cottonseed meal and at the last cultivation apply 100 pounds per acre of nitrate of soda. When the corn is a foot high if it indicates too rapid growth, bar off each side of the rows with a turning plow and let the corn stand four or five days. The barring off is advised only in case of excessively enriching and fertilizing the soil till it stimulates growth too much. The barring off is designed to check abnormal growth.

The above plan is only for large yields. It is not recommended as economical or profitable for the general farmer. The plan is only valuable in sections of abundant rainfall.

TOOLS AND IMPLEMENTS REQUIRED.

High-priced labor and generally changed conditions make it imperative that more and better farm implements be used on every farm,

whether large or small in area. No man can farm now without at least a good breaking or turning plow (a reversible disc is preferable), a disc harrow, a section harrow, a good combination planter, a weeder, and one single-row or one double-row cultivator. This latter implement will work two rows completely at one time. The above are essential, and if the size of the farm and the means of the farmer will allow it, many other convenient labor-saving tools can be added.

MORE HORSE POWER NECESSARY.

To use more horse power and less man power per acre or to quit farming is a necessity confronting the South.

There should be more mares on the farm. In the future few small farmers will find it profitable to keep mules; the colts must pay for the expense of using more horse power. In this connection, the more economical feeding of work stock on the farm is of primary importance. Feeding a horse or a mule on pulled corn fodder and corn is so expensive and out of date that it is surprising to find any one doing it. Farmers have fully proved that pasture for summer and well-cured hay for winter should be the main reliance. By a pasture is not meant a brush patch or a field of weeds, but a tract of land well set in nutritious grasses and well located so as to be usable at all times.

The best results are obtained by providing two pastures, in order to alternate in their use, and especially to allow one to have quite a growth of grass for late fall feeding. Some farmers use one pasture for late fall and spring, and the other during the summer and early fall months; others believe that the best results are obtained by alternating the use of these pastures every month. It is just as injurious to the rapid growth of grass to keep it closely grazed as it would be to a bush to cut it off every morning. It is estimated that three or four times as many animals can be kept on a given number of acres by dividing the land into two pastures and using them alternately for grazing. It is certain that the stock does better under such conditions.

THE COWPEA CROP.

The cowpea is a part of the corn problem in the South, and the plan generally adopted of broadcasting half a bushel to a bushel of seed to the acre at the time of the last working of the corn and covering with the cultivator has given good results.

The corn should be gathered as early as practicable and the stock turned in. Fortunate is the man who has tight fencing, so that the pigs, as well as the work stock and cattle, can have a chance at the cowpeas. On some of the poorer lands the corn rows may be made 6 feet apart and a row of peanuts planted between them; this will add to the value of the fall pasture when no cowpeas are planted. As soon as the crop of cowpeas has been fairly well grazed, break deep, setting the furrows on edge; harrow; sow to oats, vetch, winter barley, or rye, and turn this under in the spring. This plan will economically improve the soil and greatly increase the average crop production.

Where the season is too short to carry out the foregoing plan successfully it has been found that planting vetch and rye or crimson clover in the corn and turning them under in the spring rapidly builds up the soil and is much more economical than the use of large quantities of commercial fertilizers. The general object is to keep the land occupied summer and winter, producing something of value for food or fertilizer and at the same time protecting the loose soils from washing or leaching by the heavy rains of winter and spring.

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Special Agent in Charge.

WASHINGTON, D. C.
February 16, 1911.